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Adamanotus uncotibialis a new genus and species of South African Carventinae (Heteroptera, Aradidae)

by

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Adamanotus uncotibialis **gen. et spec. nov.**, a species with sexually dimorphic hind legs, is described and figured.

INTRODUCTION

Only four species of Carventinae, all belonging to *Dundocoris*, have hitherto been described from South Africa (Hoberlandt 1959, Kormilev 1961). Several undescribed taxa have been collected by the author during the past decade in an extensive survey of the Aradidae in South Africa. The apterous Carventinae are limited to indigenous evergreen coastal and montane forests and all the major forests and many of the relicts have been visited to collect specimens. This paper is the first in a series in which the new taxa will be described.

MATERIAL and METHODS

Specimens were collected and stored in 70% ethanol until they were mounted or prepared for examination by scanning electron microscope (SEM). The Carventinae are characterised by the presence of a hardy, insoluble encrustation that covers the greater part of the body and obscures the surface detail. It is difficult but necessary to remove this encrustation in order to examine and describe the sculpture. The encrustation was removed by submerging the whole specimen in a hot solution of 10% potassium hydroxide for 1–2 minutes to soften the encrustation while cleaning it in a Bransonic 321 ultrasonic cleanser. Parts were treated the same way or cleaned in the ultrasonic cleanser while still in 70% ethanol. They were glued to the SEM stubs with double-sided cellotape or a special glue. In the case of whole specimens, a small amount of colloidal silver or graphite paste was applied to the neck, leg bases and pygophore (in a way that was not visible from above) to improve conductivity. They were then air dried and coated with gold before being examined with a Hitachi Model S-450 SEM using an acceleration voltage of 15kV or 20kV.

When desirable the gold coating was removed afterwards by submerging the specimen in a saturated solution of potassium cyanide in H_2O until all the gold was dissolved. This took anything from a few minutes to a few hours.

The aedeagi were prepared from specimens that were collected in copulation. The ovipositor was carefully cut away and the aedeagus freed. The whole pygophore

Table 1 Measurements (in mm) of *Adamanotus uncotibialis* **spec. nov.**

		Type	NGOME FOREST				HAWAAN FOREST				TOTAL*			
			N	Mean	SD	Range	N	Mean	SD	Range	N	Mean	SD	Range
MALES		Holotype												
Total	length	5,418	10	5,210	0,135	5,062–5,448	10	4,847	0,168	4,567–5,119	30	5,047	0,303	4,235–5,586
	width	2,160	10	2,073	0,087	1,927–2,176	10	2,014	0,072	1,884–2,106	30	2,090	0,155	1,785–2,479
Head	length	0,937	10	0,944	0,023	0,901–0,986	10	0,902	0,036	0,833–0,960	30	0,942	0,053	0,833–1,091
	width	0,924	10	0,925	0,025	0,873–0,964	10	0,893	0,026	0,844–0,937	30	0,922	0,039	0,844–1,025
Pronotum	length	0,814	10	0,772	0,056	0,638–0,823	10	0,615	0,047	0,547–0,711	30	0,688	0,084	0,547–0,823
	width	1,520	10	1,471	0,051	1,373–1,528	10	1,430	0,039	1,372–1,485	30	1,464	0,073	1,308–1,641
Tergal disk	length	1,291	10	1,262	0,050	1,196–1,355	10	1,142	0,034	1,104–1,225	30	1,236	0,111	1,022–1,481
	width	1,435	10	1,400	0,055	1,300–1,463	10	1,335	0,048	1,283–1,449	30	1,387	0,105	1,084–1,616
	I	0,403	10	0,418	0,024	0,387–0,469	10	0,450	0,032	0,409–0,501	30	0,434	0,362	0,344–0,501
Antennal	III	0,298	10	0,290	0,016	0,259–0,313	10	0,281	0,024	0,242–0,320	30	0,284	0,023	0,231–0,320
segments	III	0,395	10	0,383	0,022	0,357–0,419	10	0,365	0,016	0,342–0,393	30	0,383	0,026	0,336–0,435
	IV	0,286	10	0,303	0,017	0,281–0,328	10	0,303	0,022	0,271–0,332	30	0,309	0,021	0,271–0,354
FEMALES		Allotype												
Total	length	6,095	10	6,188	0,234	5,813–6,580	10	5,748	0,146	5,540–5,995	30	5,913	0,426	4,792–6,603
	width	2,639	10	2,607	0,151	2,220–2,748	10	2,445	0,090	2,267–2,598	30	2,552	0,207	2,190–3,041
Head	length	1,096	10	1,103	0,039	1,060–1,191	10	0,949	0,027	0,910–0,994	30	1,308	0,079	0,910–1,191
	width	1,030	10	1,031	0,025	1,001–1,087	10	0,947	0,028	0,904–0,996	30	0,998	0,053	0,904–1,100
Pronotum	length	0,803	10	0,787	0,056	0,706–0,909	10	0,660	0,017	0,632–0,698	30	0,721	0,071	0,590–0,909
	width	1,629	10	1,562	0,082	1,409–1,680	10	1,579	0,060	1,479–1,677	30	1,588	0,093	1,409–1,791
Tergal disk	length	1,617	10	1,665	0,109	1,434–1,817	10	1,502	0,060	1,408–1,614	30	1,589	0,152	1,348–1,959
	width	1,764	10	1,742	0,090	1,541–1,851	10	1,696	0,074	1,586–1,833	30	1,728	0,129	1,454–2,006
	I	0,463	10	0,467	0,023	0,420–0,494	10	0,467	0,033	0,409–0,511	30	0,473	0,034	0,409–0,542
Antennal	II	0,296	10	0,332	0,030	0,295–0,401	10	0,283	0,027	0,237–0,320	30	0,309	0,038	0,237–0,401
segments	III	0,414	10	0,432	0,020	0,405–0,464	10	0,366	0,017	0,325–0,383	30	0,402	0,041	0,325–0,478
	IV	0,350	10	0,342	0,012	0,324–0,361	10	0,297	0,020	0,275–0,332	30	0,323	0,027	0,275–0,363

* Including individuals from Ngome Forest, Hawaan Forest as well as 10 specimens from various other localities.

with the inflated aedeagus was dried by critical point drying and then prepared for, and examined under the SEM as with the other parts.

Measurements in Table 1 were obtained by projecting an image of the insect onto a digitizer tablet of a Kontron image analyzer computer by means of a Zeiss SV8 stereomicroscope fitted with a camera lucida. The measurements were then taken by using a cross-hair cursor. The correct scale was obtained by projecting the image of a stage micrometer (under the same magnification and focus setting used for the insects) onto the digitizer tablet and measuring a specific length. Special care was taken to ensure that the structure which was being measured lay on a horizontal plane in order to minimize errors of measuring three dimensional structures by means of two dimensional images.

The chromosome number was determined by making squash preparations of the testes of various individuals from different localities. Because of the small size of the insects it was impossible to dissect out the testes of unfixed individuals. Males were thus collected, anaesthetized with ethyl acetate, cut into two through the thorax (in order to assist the penetration of the fixative) and fixed in a freshly prepared solution of 2,5 : 1 :: methanol : propionic acid. The fixed individuals were stored in the fixative in a refrigerator (±4 °C) for a few days to several months until preparations were made. The preparations were made by dissecting the testes out and squashing them in a 1% solution of carmine in 45% acetic acid according to the conventional method.

The material on which this study is based will be housed in the following institutions which are referred to in the text by the accompanying abbreviation.

AMGS – Albany Museum, Grahamstown, South Africa.
AMNH – American Museum of Natural History, New York, USA.
BMNH – British Museum (Natural History), London, England.
BMSA – National Museum, Bloemfontein, South Africa.
CASC – California Academy of Sciences, San Francisco, California, USA.
DHJS – Collection of author, Pretoria, South Africa.
DMSA – Durban Museum and Art Gallery, Durban, South Africa.
EHIA – Collection of E. Heiss, Josef Schraffl-strasse 2A, A-6020 Innsbruck, Austria.
HNHM – Hungarian Natural History Museum, Budapest, Hungary.
ICCM – Carnegie Museum of Natural History, Pittsburg, Pennsylvania, USA.
ISNB – Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium.
MNHN – Museum National d'Histoire Naturelle, Paris, France.
MRAC – Museé Royal de l'Afrique Centrale, Tervuren, Belgium.
MZLU – Zoological Institute, Lund University, Lund, Sweden.
NHMV – Naturhistorisches Museum Wien, Vienna, Austria.
NHRS – Naturhistoriska Riksmuseet, Stockholm, Sweden.
NMBZ – National Museum of Zimbabwe, Bulawayo, Zimbabwe.
NMSA – Natal Museum, Pietermaritzburg, South Africa.
QBUM – Museum Nacional, Rio de Janeiro, Brazil.
QMBA – Queensland Museum, Brisbane, Australia.
SAMC – South African Museum, Cape Town, South Africa.
SANC – National Collection of Insects, Pretoria, South Africa.

SEMC	– Snow Entomological Museum, University of Kansas, Lawrence, Kansas.
SMWH	– State Museum, Windhoek, Namibia.
TMSA	– Transvaal Museum, Pretoria, South Africa.
USNM	– Smithsonian Institution, National Museum of Natural History, Washington D.C., USA.
UZMD	– Universitets Zoologish Museum, Copenhagen, Denmark.
UZMH	– Zoological Museum, Helsinki, Finland.

Genus *Adamanotus* **gen. nov**

Type species: *Adamanotus uncotibialis* spec. nov.
Etymology: *Adamas* (L) = diamond, and *notum* (Gr) = dorsal thoracic plate, referring to the diamond-shaped median elevation of the mesonotum.

Apterous. Body oval, coated with a brownish encrustation.

Head: Slightly longer than wide. Genae produced beyond apex of clypeus. Subapical dorsal tubercle present on clypeus. Antenniferous lobes diverging anteriorly, apices acutely rounded. Eyes small, globular. Ocelli absent. Antennae about 1,5 × as long as width of head, 4-segmented with first segment longest and thickest. Labium 3-segmented, only two segments visible externally, shorter than head, leaving head through a slit-like atrium. Labrum not discernible. Rostral groove well developed, closed posteriorly.

Thorax: Pronotum more than 2 × as wide as long. Collar prominent with 2(1+1) large lateral tubercles and 2(1+1) smaller dorso-lateral ones. Mesonotum with prominent diamond-shaped median ridge which extends posteriad to the first abdominal tergite (MTg1) and splits the metanotum in two. Lateral parts of mesotergal disk separated from ridge by two deep furrows. Lateral lobes granular with straight, anteriorly converging margins. Metanotum divided into 2(1+1) parallelogram-shaped parts by mesonotal ridge; laterally prevented from reaching margin of body by fused dorsal external laterogites 1–3 that extend anteriad to mesonotum. Metanotum, MTg1 and MTg2 fused. MTg1 anteriomedially with 2(1+1) globose elevations, separated by a longitudinal lanceolate or semicordate sunken elevation. These elevations as high as elevation on abdominal disk. Lateral margins of MTg1+2 straight, converging posteriorly.

Legs: Hind femur and tibia of male modified, hind femur with a granulate outgrowth posteriorly (Figs 6, 7) and hind tibia with an unciform outgrowth (Fig. 16). Tarsi 2-segmented; distal segment longest, bearing two claws, each with associated curved pulvillus. Two bristle-like parempodia present.

Abdomen: *Dorsum*. Tergal disk (MTg 3–6) slightly wider than long, strongly elevated along median line, glabrous impressions separated by prominent, broad carinae. Submedian glabrous impressions surrounded by areolate surface. DELTg 1–3 fused, extending anteriad to postero-lateral angle of mesonotum. Ventral laterogites 5–7 with lateroposterior extensions visible from above. Paratergites 8 of male rounded, not reaching apex of pygophore.

Venter. Sternites 1–3 fused. Ventral laterotergites (VLTg) 3–7 well delimited by longitudinal sulci. Spiracles 2–4 sublateral; 5–7 lateral and visible from above; 8 subterminal.

Discussion: *Adamanotus* can easily be distinguished from all other African genera by the fused DELTg 1+2+3 which extends anteriad to the mesonotum and prevents the metanotum from reaching the lateral margin of the body; the diamond-shaped median elevation on the thoracic notum and the sexually dimorphic, modified hind legs of the male.

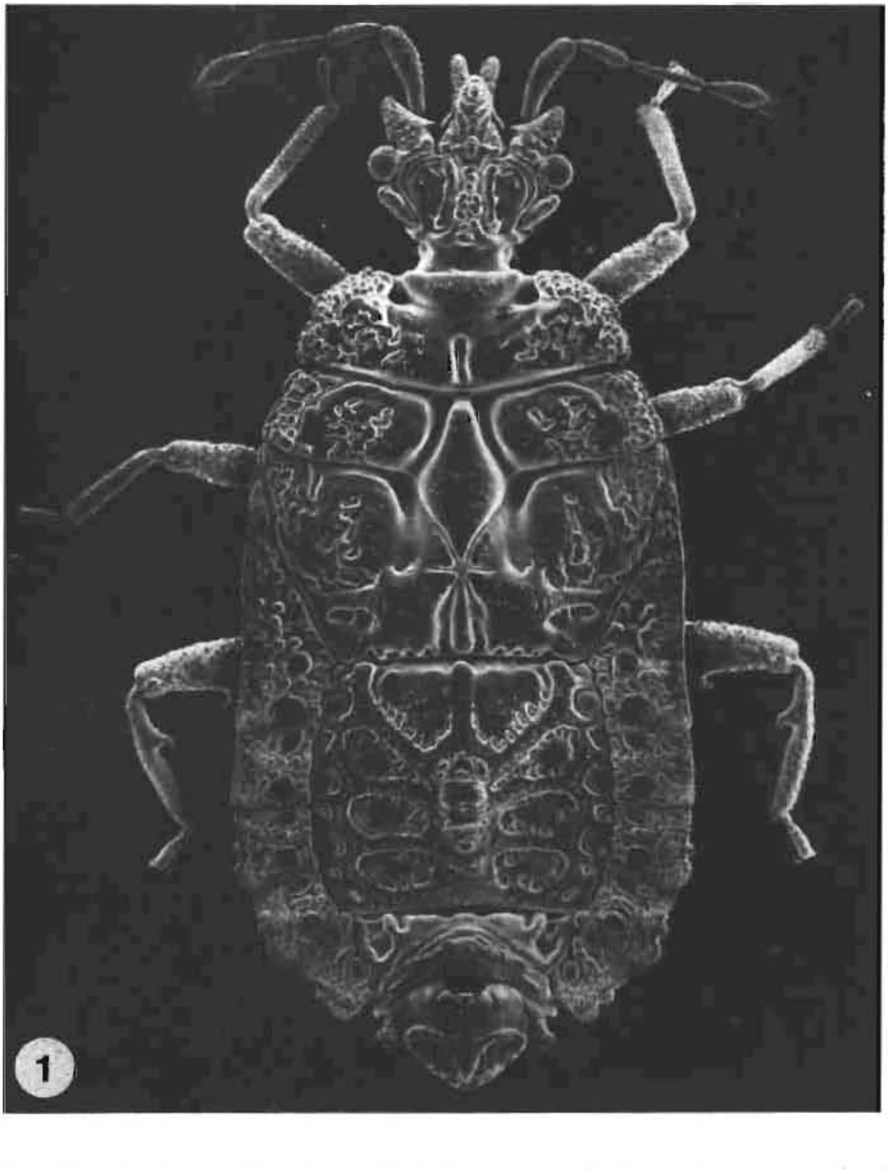


Fig. 1. Scanning electron photomicrograph of *Adamanotus uncutibialis* **gen. et spec. nov.**, dorsal aspect of male paratype.

Adamanotus uncotibialis spec. nov., Figs 1–20.

Diagnostic measurements are given in Table 1.

Apterous. Body coated with a brownish encrustation except the legs, antennae and labium. Body, especially legs, antennae and margins, covered with nodules bearing short, stiff setae (Figs 17–20). The following description is based on cleaned specimens.

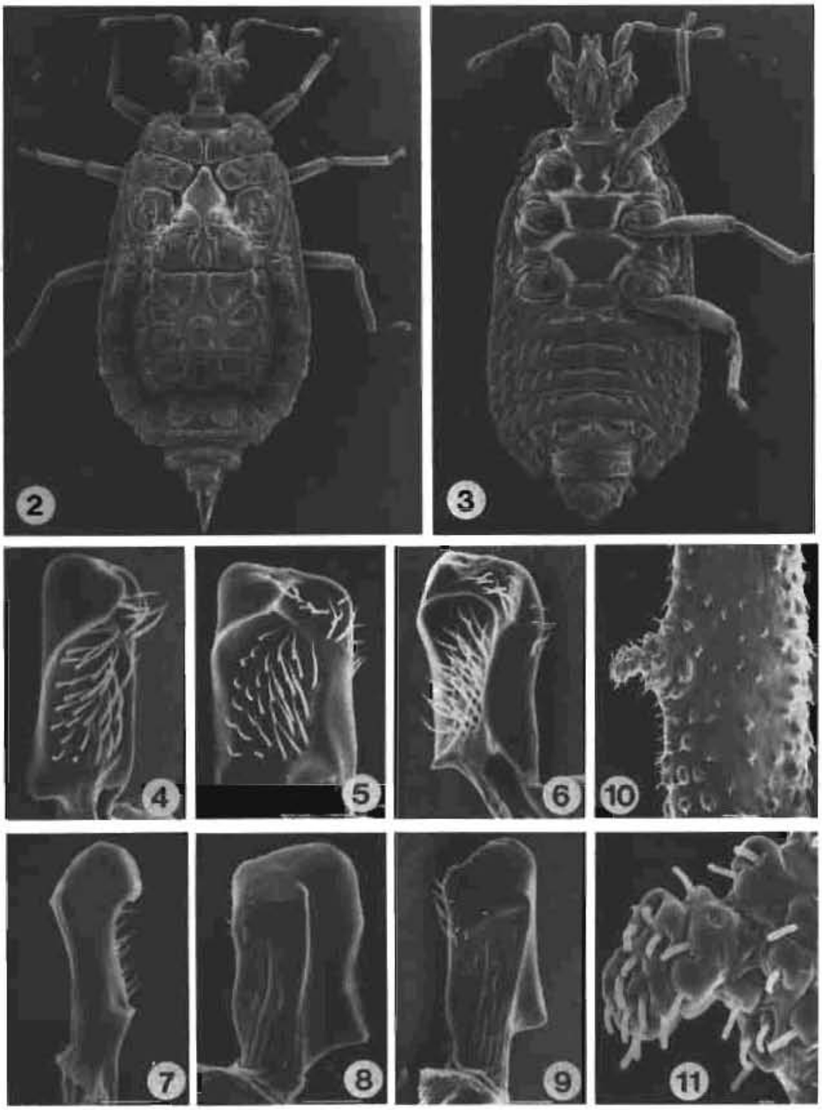
Head: About 1,03 × as long (neck region not included) as wide (across eyes). Genae straight or slightly diverging, produced beyond apex of clypeus; produced laterally at base to form a projection at level of antenniferous lobe; lateral margin concave. Jugae small. Vertex with three median longitudinal ridges, the lateral two well defined, the median one broader and irregularly nodose. Directly lateral of ridges are 2(1+1) oval interocular callosities, laterally bordered by two or three concentric ridges. Antenniferous lobes slightly declivous, diverging anteriorly, apices acutely rounded. Postocular lobes small, not reaching outer margins of eyes, lateral margins converging posteriorly. Antennae slender, 1,52 × as long as width across eyes; first segment longest and thickest, slightly curved, tapering towards base; second segment subclavate, apex thickest; third segment thinnest, slightly thickening towards apex, pedicellate; fourth segment fusiform, with a short pedicel, conical apex pilose; relative lengths of segments 26:17:23:18,5. First segment of labium concealed in the head cavity, second segment flattened where it leaves the head through a slit-like atrium, third segment longest. Elevated rim of rostral groove coarsely granulated. Neck constricted just behind head, swollen posteriorly.

Thorax: *Dorsum*. Pronotum about 2,2 × as wide as long. Pronotum constricted behind collar. Lateral lobes granulate, margin evenly convexly rounded, moderately elevated and slightly reflexed so that propleural margins visible from above. Disk smooth medially, with a deep longitudinal median furrow posteriorly that does not reach the collar, irregularly excavated laterally.

Mesonotum transverse, wider and shorter than pronotum. Lateral lobes granulate, margins straight, converging anteriorly. Disk separated into two parts by a prominent median diamond-shaped ridge which also splits the metanotum in two and reaches the first abdominal tergite (MTg1). This ridge is strongly elevated posteriad (especially in females), and is separated by deep grooves from the rest of the mesonotum and by narrower and more shallow grooves from two triangular parts of the metanotum which is also strongly elevated postero-mediad. Mesonotum laterally separated from metanotum by a deep transverse sulcus at level of widest point of median ridge. Sulcus ends here in 2(1+1) deep pits.

Metanotum longer than mesonotum but prevented from reaching lateral margins of body by fused dorsal external latergites 1–3 (DELTg 1+2+3) that extend to mesonotum anteriorly. Matanotum divided into 2(1+1) parallelogram-shaped parts by mesonotal median ridge, each of which is divided into three distinct areas: a raised triangular part adjacent to the median ridge, a large subquadrate disk which is separated from the latter by a deep longitudinal groove that becomes more shallow posteriad, and a triangular granulate anterolateral part which is separated from the previous part by an irregular groove. Metanotum fused with MTg1 but line of fusion discernable by the sculpture of the segments laterally (MTg1 forms a smooth transverse elevation) and a groove medially.

MTg1 and MTg2 fused, medially with a lanceolate (males) or subcordate (females) longitudinal sunken ridge which is separated by a groove from 2(1+1)



Figs. 2–11. Scanning electron photomicrographs of *Adamanotus uncotibialis* **gen. et spec. nov.** 2. Female paratype, dorsal aspect. 3. Male paratype, ventral aspect. 4–9. Different aspects of the left paramere (scale bar = 50 μm). 10. Hind femur of male with protuberance (scale bar = 50 μm). 11. Close-up view of protuberance (scale bar = 5 μm).

anterosubmedian globose elevations. From these elevations surface evenly declines laterally (forming previously mentioned smooth elevations) and posteriorly. Two (1+1) deep transverse indentations present posterolateral of these elevations, probably representing part of the intersegmental sulcus. Posterior margin undulate, lateral margins straight, converging posteriad.

Venter. Pro-, meso- and metasterna smooth. Pro- and mesosterna each with 2(1+1) nodules just mediad of the coxae. Meso- and metasterna each with a median oval finely rastrate area.

Legs: Slender, covered with setiferous tubercles. Trochanters clearly discernible. Femora slightly swollen, hind femur of male with a granulate toothlike lobe posteriorly (Figs 6, 7). Tibiae slender, protibial comb present, hind tibia of male with an unciform outgrowth bearing a pointed bunch of stiff setae apically, about 2/5 of its length from base (Figs 1, 16).

Abdomen: *Dorsum*. Tergal disk about 1,1 × as wide as long, lateral margins convex, strongly elevated along median line with highest point at scent gland opening on posteriorly projecting margin of MTg3; glabrous impressions separated by prominent broad carinae; area between submedian impressions and carinae irregularly areolate. Lateral margin of fused DELTg 1–3 slightly sinuate. Posterolateral angles of DELTg 5–7 with small rounded lobes, increasing in size on subsequent DELTg's, which are extensions of the ventral laterogites. MTg7 of males raised with a nodulate transverse ridge before posterior margin; paratergites 8 short, rounded, not reaching apex of pygophore. MTg7 of females with a prominent transverse ridge before posterior margin; anterior to this ridge 2(1+1) large elevated areas, separated medially by a longitudinal, less elevated ridge, are present. Paratergites 8 produced posteriorly as 2(1+1) semi-acute lobes that nearly reach the level of the apex of tergite 9.

Venter (Fig 3). Sternites 1–3 fused but 1+2 separated from 3 by foveate sculpture anteriorly on sternite 3. Oval finely rastrate areas medially present on sternites 1+2, 3–7. Intersegmental sutures 3/4, 4/5 and 5/6 well developed, reaching lateral margins of body. Intersegmental suture 6/7 in males bi- or trisinuate, in females produced antero-medially to accommodate genitalia. Ventral laterotergites 3–7 (VLTg 3–7) well delimited by longitudinal sulci just laterad of longitudinal glabrous ridges. Spiracle 2 sublateral, far from lateral margin, placed on a prominent elevation; spiracles 3–4 sublateral but nearer to margin; 5–7 lateral and visible from above; 8 subterminal on paratergites.

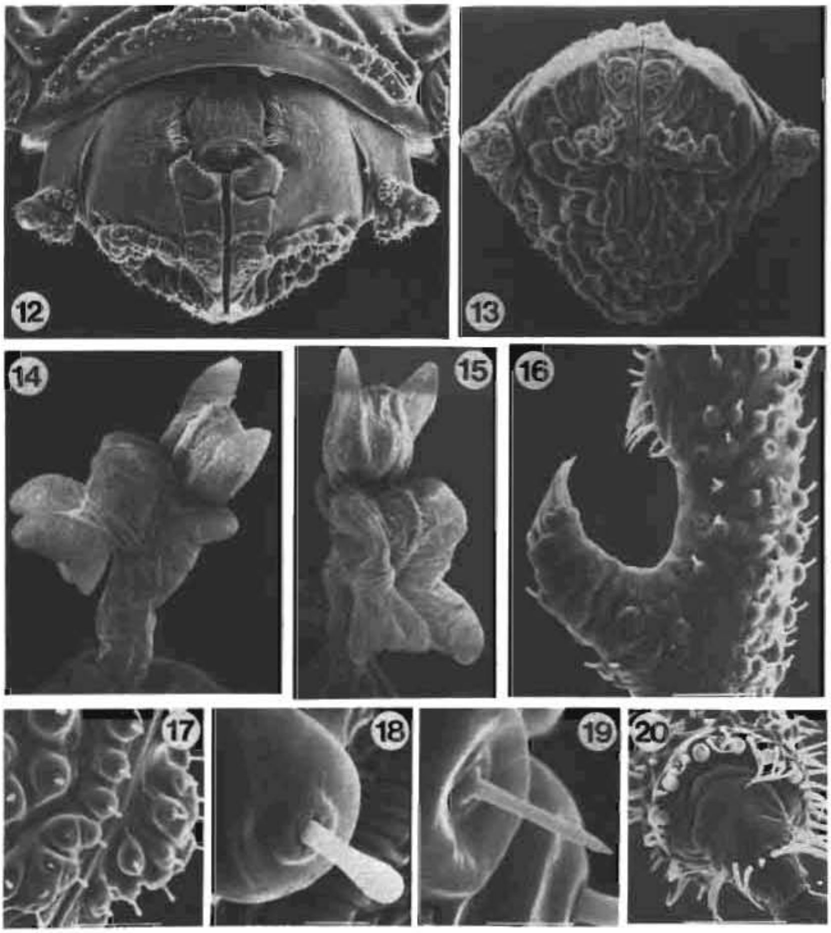
Genitalia. Visible part of male pygophore (in caudal view) pyriform with rugose surface, dorsally with a split triangular median ridge which ends posteriorly just before a transverse ridge which is also split (Fig 12, 13). In dorsal view of part usually obscured by MTg7, 2(1+1) subquadrate 'pseudophallic styli' are present just posteriad of the dorsal visible parts of the parameres (Fig 12). The lateral sensory areas, laterad of the proctiger, each bear a fringe of long hairs mesally and sparse short setae laterally. The parameres (Figs 4–9) with a dorsomesal reflexed lobe, inner surface with long hairs, outer surface with a prominent ridge. Aedeagus as in Figs 14–15.

Female genitalia similar to those of most Carventinae.

Chromosome number. 2n(♂) = 16XY.

Habitat and distribution. Coastal and montane evergreen forests of the eastern parts of South Africa where they can be collected on moist fallen twigs and branches. The known distribution is shown in Fig 21.

Etymology. *Uncus* (L) = hook, and tibia (L) = tibia referring to the unciform protuberance of the hind tibia.



Figs. 12–20. Scanning electron photomicrographs of *Adamanotus uncotibialis* **gen. et spec. nov.** 12–13. Pygophore. 12. Dorsal aspect (scale bar = 50 μm). 13. Caudal aspect (scale bar = 50 μm). 14–15. Inflated aedeagus. 14. Lateroposterior aspect. 15. Dorsoposterior aspect. 16. Unciform outgrowth of hind tibia of male (scale bar = 50 μm). 17. Lateral extension of ventral laterotergite 5 at posterolateral angle of DELTg 5, dorsal view, showing the sculpture and different types of setae (scale bar = 50 μm). 18. Short stiff clavate seta (scale bar = 5μm). 19. Short thin acute seta (scale bar = 5 μm). 20. Apex of tibia showing pointed curved setae and prominent conical setae (scale bar = 50 μm).

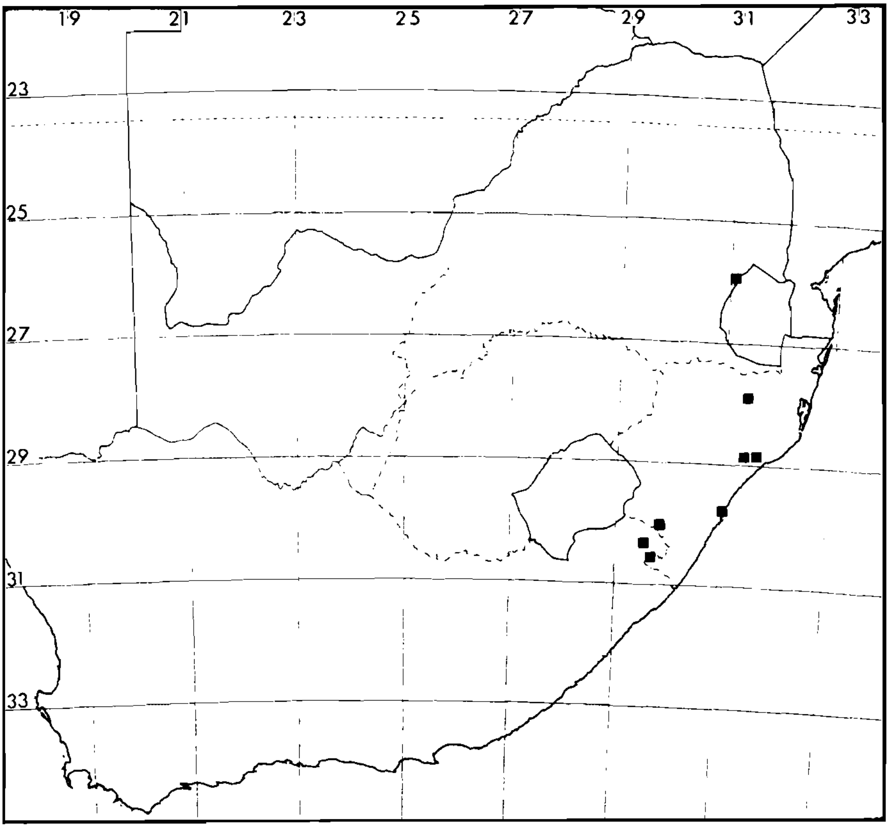


Fig 21. Distribution map of *Adamanotus uncotibialis* **gen. et spec. nov.**

Discussion. This species is easily distinguished from all other described African species as discussed under the genus description. Small morphological differences exist between populations of different localities, for example in the population from Hawaan Forest near Durban the individuals are significantly smaller than those from the type locality (Ngome Forest). The relative lengths of the antennal segments are also slightly different between these populations.

Material examined: SOUTH AFRICA, Natal. ♂ Holotype: Ngome Forest, nr. Louwsburg, 27°49'S 31°25'E, 20–24.i.1983, D. H. Jacobs (TMSA); ♀ allotype: ditto (TMSA); 485 paratypes as follows: Transvaal. 2♂♂: nr. Barberton, 25°54'S 31°06'E, 30.vi.1979, D.H. Jacobs (DHJS). Natal. 86♂♂ 76♀♀: Same data as holotype (2♂♂ 2♀♀ each AMGS, AMNH, BMNH, BMSA, CASC, DMSA, HNHM, ICCM, ISNB, MNHN, MRAC, MZLU, NHMV, NHRS, NMBZ, NMSA, QBUM, QMBA, SAMC, SANC, SEMC, SMWH, USNM, UZMD, UZMH, 20♂♂ 15♀♀ TMSA, 16♂♂ 11♀♀

DHJS); 16♂♂ 14♀♀: Ngoye Forest Reserve, nr Empangeni, 28°50'S 31°43'E, 11–12.xii.1980, D.H. Jacobs (8♂♂ 8♀♀ DHJS, 8♂♂ 6♀♀ TMSA); 5♂♂ 6♀♀: ditto, 22.viii.1985 (2♂♂ 3♀♀ BMNH, 3♂♂ 3♀♀ MRAC); 12♂♂ 7♀♀: ditto, E. Heiss (EHIA); 13♂♂ 9♀♀: Dhlinza Forest, Eshowe, 28°54'S 31°27'E, 12.iv.1980, D.H. Jacobs (3♂♂ 3♀♀ CASC, 3♂♂ 2♀♀ USNM, 7♂♂ 4♀♀ DHJS); 6♂♂ 4♀♀: ditto, 21.viii.1985 (3♂♂ 2♀♀ DHJS, 3♂♂ 2♀♀ TMSA); 42♂♂ 15♀♀: ditto, E. Heiss (EHIA); 1♂: Z.A.33, Dhlinza Forest, Eshowe Dist., x.1960, Humus, no collector given (TMSA); 28♂♂ 33♀♀: Hawaan Forest, nr. Umhlanga Rocks, 29°42'S 31°05'E, 26.i.1983, D.H. Jacobs (2♂♂ 2♀♀ each AMNH, BMNH, BMSA, CASC, MRAC, NMSA, SANC, SEMC, SMWH, USNM, 3♂♂ 5♀♀ TMSA, 5♂♂ 8♀♀ DHJS); 15♂♂ 8♀♀: Nxumeni Forest, nr. Donnybrook, 29°56'S 29°51'E, 1.xii.1981, D.H. Jacobs (9♂♂ 6♀♀ DHJS, 6♂♂ 2♀♀ TMSA); 21♂♂ 17♀♀: Ngele Forest, nr. Kokstad, 30°32'S 29°41'E, 28.xi.1981, D.H. Jacobs (11♂♂ 9♀♀ DHJS, 10♂♂ 8♀♀ TMSA); 31♂♂ 13♀♀: Lesser Stinkwood Forest, nr. Kokstad, 30°33'S 29°43'E, 29.xi.1981, D.H. Jacobs (11♂♂ 5♀♀ DHJS, 20♂♂ 8♀♀ TMSA). TRANSKEI. 1♂ 4♀♀: Sneezewood Forest, nr. Umzimkulu, 30°15'S 29°37'E, 1.xii.1981, D.H. Jacobs (DHJS).

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